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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/542,359	07/14/2005	Shoichi Kikuchi	274618US0PCT	2815

22850 7590 02/09/2007

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EXAMINER	
MCNELIS, KATHLEEN A	
ART UNIT	PAPER NUMBER
1742	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/09/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/542,359	KIKUCHI ET AL.	
	Examiner	Art Unit	
	Kathleen A. McNelis	1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 July 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9/27/05, 7/14/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Claims Status

Claims 1-22 are presented for examination wherein claims 2 and 4-22 are amended.

Examiner's Comments

Please check spelling and punctuation of the claims, e.g. colon at end of claim 16, "THE" in claim 20.

DETAILED ACTION

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-4 and 7-21 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 3, 5 and 9-16 of copending application 10/482,403, published as US 2004/0173054.

This is a provisional rejection.

With respect to instant claims 1, 3 and 7, '054 claim 1 discloses a method for producing metallic iron from a mixture of iron oxide and carbonaceous materials on the hearth of a reduction melting furnace by heating, reduction melting and cooling the obtained metallic iron and

discharging the metallic iron outside of the furnace. '054 claim 1 further discloses that a layer of hearth material is laid on the hearth prior to supplying the mixture, thereby forming a renewable hearth and the metallic iron is produced while renewing a part or the whole of the renewable hearth with has deteriorated during operation. Claim 5 discloses that the thickness of the renewable hearth is adjusted.

Instant claim 2 does not recite any process steps and therefore does not further limit claim 1. Since '054 discloses performing essentially the same process with essentially the same materials, hearth degradation would occur in essentially the same manner.

With respect to instant claim 4, '054 claim 3 discloses filling dents formed in the surface.

With respect to instant claim 8, '054 claim 5 discloses that the thickness of the renewable hearth is adjusted. The selection of any order of performing process steps is prima facie obvious in the absence of any new or unexpected results (MPEP section 2144.04 IV, C).

With respect to instant claims 9-13, '054 claims 11 and 13 disclose that a carbonaceous layer is used as a layer on the hearth. '054 claim 9 discloses a high melting material of alumina, magnesia (i.e. MgO) or silica carbide. The carbonaceous material, alumina magnesia or silica carbide has high melting points and corrosion resistance against the slag. Further, '054 recites a hearth material with high melting point and corrosion resistant to produced slag.

With respect to instant claim 14, '054 claim 10 discloses a sintering accelerator.

With respect to instant claim 15, '054 claim 11 discloses providing a coolant to the hearth material.

With respect to instant claim 16, '054 claims 11 and 12 disclose softening the hearth material.

With respect to instant claim 17, '054 claims 11 and 13 disclose placing a powder carbonaceous substance as a layer on the hearth material and then supplying the mixture of iron oxides and carbonaceous materials.

With respect to instant claim 18, '054 claim 9 discloses a high melting material of alumina, magnesia (i.e. MgO) or silica carbide.

With respect to instant claim 19, '054 claim 14 discloses mixing the hearth material with atmosphere modifier (i.e. carbonaceous material).

With respect to instant claim 20, '054 claim 15 discloses forming 2 or more layers.

With respect to instant claim 21, '054 claim 16 discloses placing the carbonaceous material between the hearth and renewable hearth material.

Claims 1-4, 7 and 9-14 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 15, 16, 18, 19, 26 and 28 of Hoffman et al. (U.S. Pat. No. 6,648,942).

Although the conflicting claims are not identical, they are not patentably distinct from each other because:

With respect to instant claims 1, 3, 4 and 7, '942 claim 15 discloses a method of producing iron by distributing hearth conditioning material onto a refractory surface, charging pre-reduced metallized iron onto the hearth conditioning material, melting and reacting the metallized iron to form nuggets and discharging the nuggets and hearth conditioning material. Claim 16 discloses that the hearth conditioning material is recovered. Claim 26 discloses that residual iron oxide forms iron, therefore reduction (claim 26) and melting (claim 15) occur in the furnace (i.e. the furnace is a reduction melting furnace). Since the hearth conditioning material is discharged from the furnace, separated and recovered (claim 15 and 16), one of ordinary skill in the art would

expect that the entire layer would be renewed. '942 claim 28 discloses forming a level surface with a smoothing device, therefore one of ordinary skill in the art would expect recesses to be filled and the hearth thickness to be adjusted.

Instant claim 2 does not recite any process steps and therefore does not further limit claim 1. Since '942 discloses performing essentially the same process with essentially the same materials, hearth degradation would occur in essentially the same manner.

With respect to instant claims 9-14, '942 claim 18 discloses that the hearth conditioning material contains carbon materials (i.e. atmosphere modifiers). Claim 19 discloses that the hearth conditioning materials also contain silica, CaO, alumina bauxite fluorspar and magnesia. Further, the instant specification defines a "sintering accelerator" as any substance that develops the effect as a binder, and an example of a silica compound. Therefore the silica in '942 meets the limitation of a sintering accelerator.

Claims 1-22 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of Kikuchi et al. (U.S. Pat. No. 6,592,649) or claims 3 and 13 of Kikuchi et al. (U.S. Pat. No. 6,210,462) or claims 23-25 of Meissner et al. U.S. Patent No.(6,413,295) or claim 1 of Ito et al. (U.S. Pat. No. 6,630,010) or claims 26 and 31 of Hoffman et al. (U.S. Pat. No. 6,749,664) or claims 1, 8-10 and 12 of Fuji et al. (U.S. Pat. No. 6,602,320) or claims 1 and 4 of Negami et al. (U.S. Pat. No. 6,036,744) or claims 4 and 5 of Negami et al. (U.S. Pat. No. 6,506,231) or claim 1 of or copending application 10/486,498 (published as US 2004/0211295) or claims 1, 7 and 8 of copending application 10/548,955 (published as US 2006/0169103) in view of WO 00/29628 (WO '628).

Although the conflicting claims are not identical, they are not patentably distinct from each other because:

With respect to instant claims 1 and 3:

- '649 claim 1 discloses a method for producing metallic iron by reducing an iron oxide material then melting to separate the iron from slag forming iron nuggets.
- '462 claim 3 discloses depositing a product release promotion layer on a hearth, then laying a mixture of powder containing iron oxide and a carbonaceous reducing agent, heating, reducing and melting to separate the metallic iron from slag. '462 claim 13 recites that the product release promotion layer is magnesia, calcia or alumina..
- Meissner et al. '295 claim 23 discloses a method for producing solid iron and carbon products from iron oxide by providing a sub-hearth surface layer, introducing conditioning materials including carbon and silica compounds, placing iron oxides and carbon on the layer, reducing and melting the iron, cooling and discharging. Claim 24 discloses that the furnace is a rotary hearth and claim 25 discloses that the conditioning materials are magnesium oxide, silicon oxide compounds, and carbon.
- '010 claim 1 discloses a method for heating iron oxide in a reduction melting furnace, reducing and melting the iron while separating the gangue and causing the molten metal to coalesce into granular metallic iron.
- '664 claim 26 discloses a method for producing solid iron from iron oxide and carbon compounds on a hearth surface by adding a plurality of layers of conditioning compounds onto the hearth surface, introducing a coating material onto the layers, adding carbon onto the top of the coating layer, reducing and melting the iron and discharging the solid iron from the furnace. Claim 31

discloses that the coating materials are graphite, charcoal, coal particles, fire clay and/or coke fines. The instant specification defines a "sintering accelerator" as any substance that develops the effect as a binder, and an example of kaolin (i.e. a clay), therefore the fire clay in '664 meets the limitation of a sintering accelerator. Since '664 discloses discharging the iron and carbon (i.e. coating layer) from the furnace (claim 26), one of ordinary skill in the art would expect that the coating would be replaced before adding more iron oxide material (i.e. repeat process starting with at least step (d)).

- '320 claim 1 discloses a method for producing reduced iron by charging agglomerates of iron oxide containing material into a furnace and reducing to produce reduced iron. Claims 8 and 9 disclose first charging a carbonaceous powder to the hearth of the furnace. Claim 10 discloses that the furnace is a rotary hearth. Claim 12 discloses a further sep of melting the metallic iron and coagulating the molten metallic iron.
- '744 claim 1 discloses a method for producing metallic iron by heating iron oxide and a carbonaceous reducing agent, reducing and separating the metallic iron from the slag. Claim 4 discloses that at least part of the iron is melted.
- '231 claim 4 disclose a method of producing metallic iron by charging iron oxide and a carbonaceous reducing agent into a thermal reduction apparatus, reducing the mixture and melting at least part of the iron, therefore the apparatus is a reduction melting furnace. '231 discloses chilling the metallic iron (claim 4 step G). '231 claim 5 discloses that the heating is preformed while apparatus is moving in a horizontal direction.

- Kikuchi et al. '295 claim 1 discloses producing metallic iron by heating, reducing and melting iron-oxide with carbonaceous reductant in a reduction melting furnace of moving hearth type. This is a provisional rejection.
- '103 claim 1 discloses a method of manufacturing granulated metallic iron from a raw material containing an iron oxide and a carbonaceous reducing agent in a rotary hearth type furnace were the iron oxide is reduce, coalesced and separated from resultant slag followed by cooling of the metallic iron to solidify. Since the iron must be cooled to solidify, one of ordinary skill in the art would expect that it was at least partially melted. Claim 7 discloses spreading a carbonaceous powder on the hearth prior to supplying the raw material mixture. Claim 8 discloses that the layer is 2 mm or more.

'649 or '462 or '010 or '664 or '320 or '744 or Kikuchi et al. '295 does not claim forming a renewable hearth layer capable of being renewed, cooling the metallic iron ore renewing a part or whole of the hearth after removing the hearth and leveling the surface.

Meissner et al. '295 or '231 or '103 does not claim renewing a part or whole of the hearth after removing the hearth and leveling the surface.

WO '628 discloses a method for reducing iron oxide with a carbon material in a rotary hearth furnace where the hearth layer is coated with materials including carbon, silicon oxide (i.e. silica), magnesium oxide and/or aluminum oxide. The coating material is placed on the hearth before the iron oxide ore and carbon materials are added to protect the hearth. The iron oxide is reduced and forms molten globules (abstract), therefore the furnace is a reduction melting furnace. After the coating materials are placed on the surface, iron oxide and carbon is placed by feed mechanism, then heated and reduced in the furnace (p. 11). WO '628 discloses periodic

rejuvenation of the coating layer or continuous introduction of additional coating materials after the iron is discharged and before the iron oxide and carbon agglomerates are placed onto the hearth surface (paragraph bridging pp. 12-13). One of ordinary skill in the art would expect the discharge mechanism (Figs. 6-7 and p. 13 lines 5-13) to adjust the height of the surface by removing materials above a set level. It would have been obvious to one of ordinary skill in the art at the time the invention was made to add the coating material (i.e. renewable hearth) as taught by WO '628 to the reduction meting furnace of '649 or '462 or Meissner et al. '295 or '010 or '664 or '320 or '744 or '231 or Kikuchi et al. '295 or '103 to protect the hearth as taught by WO '628.

WO '628 discloses reduction and melting followed by a cooling step to solidify the separated iron and slag so that the iron may be discharged separately from the furnace (p. 5). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a cooling step as taught by WO '628 in the process of '649 or '462 or '010 or '664 or '320 or '744 or Kikuchi et al. '295 so that the iron and slag could be discharged separately as taught by WO '628.

Although WO '628 does not recite that the renewable hearth is removed, such would be expected since WO '628 discloses continuous addition of hearth material (paragraph bridging pp. 12-13) while removing material from a specific height above the surface at the discharge (Figs. 6-7 and p. 13 lines 5-13).

Claim 2 does not recite any process steps and therefore does not further limit claim 1. Since WO '801 discloses performing essentially the same process with essentially the same materials, hearth degradation would occur in essentially the same manner.

With respect to claims 4, 7 and 22, the discharge mechanism (Figs. 6-7 and p. 13 lines 5-13) would be expected to fill recesses (claim 4) and level and adjust the height of the surface

(claim 7) by removing materials above a set level as well as compact the surface. Further, WO '628 discloses a leveler (29) spanning the width of the surface (30) (p. 8 and Figs. 4-5) which would fill recesses, level and adjust the height of the surface as sell as compact the surface.

With respect to claims 5 and 6, Fig. 8 shows that the discharge mechanism (50) is in a direction intersecting the moving direction of the moving hearth (claim 5) and iron and slag are discharged in the moving direction concomitant with the moving (claim 6).

With respect to claims 8, 17 and 19, Figs 2 and 3 show that means for introducing coating materials (32) and (34) are upstream of the feed mechanism (26) for iron oxide agglomerates and downstream of the leveling means (50) (p. 9). The materials may be fine particulate (p. 9) (i.e. powder). Carbonaceous materials are atmosphere-adjusting agents.

With respect to claim 9, WO '628 discloses that the coating material includes carbonaceous material (abstract and p. 9).

With respect to claims 10 and 11, WO '628 discloses magnesium oxide (i.e. magnesia) and/or aluminum oxide (i.e. alumina) (abstract).

With respect to claim 12, WO '628 discloses that the coating material includes carbonaceous material (abstract and p. 9).

With respect to claims 13 and 18, WO '628 discloses that the coating material includes magnesium oxide (i.e. MgO) (abstract).

With respect to claim 14, the instant specification defines a "sintering accelerator" as any substance that develops the effect as a binder, and an example of a silica compound. Therefore the silica (p. 9) in WO '628 meets the limitation of a sintering accelerator.

With respect to claim 15, WO '628 discloses cooling by plate (48) having cooling liquid (i.e. coolant) flowing internally (p. 10).

With respect to claim 16, one of ordinary skill in the art would expect the heat treatment after placement on the hearth and before discharge (p. 10) to soften the hearth materials.

With respect to claim 20, WO '628 discloses feeding carbonaceous material with the coating materials and also with the iron oxide agglomerates (abstract).

With respect to claim 21, WO '628 discloses adding a carbonaceous coating (i.e. atmosphere modifier) as a separate layer (p. 14) and discloses carbonaceous material in the coating (abstract). WO '628 discloses placing the carbonaceous material (38) on the hearth layer surface (30), which is below the coating layer (36) (p. 14 and Figs. 4 and 5).

Claim Rejections - 35 USC § 102

> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-7 and 9-22 are rejected under 35 U.S.C. 102(e) as being anticipated by Tsuge et al. (U.S. PG Pub. 2004/0173054).

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Tsuge et al. is applied as discussed above regarding the rejection of claims 1-4 and 7-21 under obviousness type double patenting.

Further, with respect to claims 5, 6 and 22, Fig. 1 shows a schematic of the device where the discharging device (6) also levels and compacts the hearth material while the hearth rotates after charging the hearth material on the hearth refractory (paragraph 0034). As seen on Fig. 1, (6) intersect the moving direction of the hearth. Further, the iron is discharged through this device.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 8 is rejected under 35 U.S.C. 103(a) as being obvious over Tsuge et al. (U.S. PG Pub. 2004/0173054).

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Tsuge et al. is applied as discussed above regarding the rejection of claims 1-4 and 7-21 under obviousness type double patenting.

Claims 1-7, 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 99/20801 (WO '801).

With respect to claims 1 and 3, WO '801 discloses a method of making metallic iron by hearing a mixed powder of iron oxide containing powder by reduction an melting (abstract). In an embodiment using a rotational hearth, the process is disclosed as supply, heating, reducing and melting, with cooling mechanism 12 downstream of the heating and before discharge (pp. 16-17

and Fig. 7). A product releasing promoter such as MgO liquid suspension or powder of MgO, CaO, alumina or composite oxides is deposited on the surface of the hearth prior to the starting mixture of iron oxide (pp. 16-17). One of ordinary skill in the art would apply either alternative to achieve the expected result of releasing product. The product releasing promoter is renewable, as evidenced by continuous application disclosed. Although WO '801 does not recite that the product releasing promoter is removed, removal of at least some of the material would be expected during discharge when the embodiment of applying the product releasing promoter is used, since the hearth is rotated vertically and the product drops during discharge (Fig. 7 (3)).

Claim 2 does not recite any process steps and therefore does not further limit claim 1. Since WO '801 discloses performing essentially the same process with essentially the same materials, hearth degradation would occur in essentially the same manner.

With respect to claims 4 and 7, WO '801 discloses a pressing step after placement of the starting material (p. 16), which would fill recesses (claim 4) and adjust the thickness (claim 7).

With respect to claims 5 and 6, WO '801 Fig. 7 shows that the hearth material application by spray (13) is in a direction intersecting the moving direction of the moving hearth (claim 5) and that the metallic iron and slag discharge is in the moving direction (claim 6).

With respect to claims 10 and 11, WO '801 discloses and example product releasing promoter such as MgO liquid suspension or powder of MgO, CaO, alumina or composite oxides is deposited on the surface of the hearth prior to the starting mixture of iron oxide (pp. 16-17) which are high melting point materials having corrosion resistance to produced slag.

Claims 1-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 00/29628 (WO '628).

With respect to claims 1 and 3 WO '628 discloses a method for reducing iron oxide with a carbon material in a rotary hearth furnace where the hearth layer is coated with materials including carbon, silicon oxide (i.e. silica), magnesium oxide and/or aluminum oxide. The coating material is placed on the hearth before the iron oxide ore and carbon materials are added to protect the hearth. The iron oxide is reduced and forms molten globules (abstract), therefore the furnace is a reduction melting furnace. After the coating materials are placed on the surface, iron oxide and carbon is placed by feed mechanism, then heated and reduced in the furnace (p. 11). WO '628 discloses periodic rejuvenation of the coating layer or continuous introduction of additional coating materials after the iron is discharged and before the iron oxide and carbon agglomerates are placed onto the hearth surface (paragraph bridging pp. 12-13). The metallic iron is cooled prior to discharged from the furnace (p. 5). One of ordinary skill in the art would expect the discharge mechanism (Figs. 6-7 and p. 13 lines 5-13) to level and adjust the height of the surface by removing materials above a set level.

Although WO '628 does not recite that the renewable hearth is removed, such would be expected since WO '628 discloses continuous addition of hearth material (paragraph bridging pp. 12-13) while removing material from a specific height above the surface at the discharge (Figs. 6-7 and p. 13 lines 5-13).

Claim 2 does not recite any process steps and therefore does not further limit claim 1. Since WO '801 discloses performing essentially the same process with essentially the same materials, hearth degradation would occur in essentially the same manner.

With respect to claims 4, 7 and 22, the discharge mechanism (Figs. 6-7 and p. 13 lines 5-13) would be expected to fill recesses (claim 4) and level and adjust the height of the surface (claim 7) by removing materials above a set level as well as compact the surface. Further, WO

'628 discloses a leveler (29) spanning the width of the surface (30) (p. 8 and Figs. 4-5) which would fill recesses, level and adjust the height of the surface as sell as compact the surface.

With respect to claims 5 and 6, Fig. 8 shows that the discharge mechanism (50) is in a direction intersecting the moving direction of the moving hearth (claim 5) and iron and slag are discharged in the moving direction concomitant with the moving (claim 6).

With respect to claims 8, 17 and 19, Figs 2 and 3 show that means for introducing coating materials (32) and (34) are upstream of the feed mechanism (26) for iron oxide agglomerates and downstream of the leveling means (50) (p. 9). The materials may be fine particulate (p. 9) (i.e. powder). Carbonaceous materials are atmosphere-adjusting agents.

With respect to claim 9, WO '628 discloses that the coating material includes carbonaceous material (abstract and p. 9).

With respect to claims 10 and 11, WO '628 discloses magnesium oxide (i.e. magnesia) and/or aluminum oxide (i.e. alumina) (abstract).

With respect to claim 12, WO '628 discloses that the coating material includes carbonaceous material (abstract and p. 9).

With respect to claims 13 and 18, WO '628 discloses that the coating material includes magnesium oxide (i.e. MgO) (abstract).

With respect to claim 14, the instant specification defines a "sintering accelerator" as any substance that develops the effect as a binder, and an example of a silica compound. Therefore the silica (p. 9) in WO '628 meets the limitation of a sintering accelerator.

With respect to claim 15, WO '628 discloses cooling by plate (48) having cooling liquid (i.e. coolant) flowing internally (p. 10).

With respect to claim 16, one of ordinary skill in the art would expect the heat treatment after placement on the hearth and before discharge (p. 10) to soften the hearth materials.

With respect to claim 20, WO '628 discloses feeding carbonaceous material with the coating materials and also with the iron oxide agglomerates (abstract).

With respect to claim 21, WO '628 discloses adding a carbonaceous coating (i.e. atmosphere modifier) as a separate layer (p. 14) and discloses carbonaceous material in the coating (abstract). WO '628 discloses placing the carbonaceous material (38) on the hearth layer surface (30), which is below the coating layer (36) (p. 14 and Figs. 4 and 5).

Claims 1-4, 7 and 9-14 are rejected are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoffman et al. (U.S. Pat. No. 6,648,942).

Hoffman et al. '942 is applied as discussed above regarding the ground of nonstatutory obviousness-type double patenting.

Claims 1-22 are rejected are rejected are rejected under 35 U.S.C. 103(a) as being unpatentable over Kikuchi et al. (U.S. Pat. No. 6,592,649) or Kikuchi et al. (U.S. Pat. No. 6,210,462) or Meissner et al. (U.S. Patent No. 6,413,295) or Ito et al. (U.S. Pat. No. 6,630,010) or Hoffman et al. (U.S. Pat. No. 6,749,664) or Fuji et al. (U.S. Pat. No. 6,602,320) or Negami et al. (U.S. Pat. No. 6,036,744) or Negami et al. (U.S. Pat. No. 6,506,231) or copending application 10/486,498 (published as US 2004/0211295) in view of WO 00/29628 (WO '628).

Kikuchi et al. '649 or '462 or Meissner et al. or Ito et al. or Hoffman et al. or Fuji et al. or Negami et al. '744 or '231 or Kikuchi et al. '295 in view of WO '628 is applied as discussed above regarding the ground of nonstatutory obviousness-type double patenting.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kathleen A. McNelis whose telephone number is 571 272 3554. The examiner can normally be reached on M-F 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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